

WHAT IS CLAIMED IS:

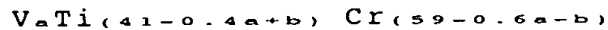
1. A hydrogen storage metal alloy which has as
5 its main phase a body-centered cubic structure-type phase
exerting a two-stage or inclined plateau characteristic
in a hydrogen storage amount vs hydrogen pressure relation,
in which the composition ratio of constituent metals for
the alloy is adjusted to an appropriate range in order to
10 reduce the stability of the hydrogen occluded in the alloy
during the low-pressure plateau region or the lower plateau
region of the inclined plateau such that an alloy temperature
(T₂) during at least a period in a hydrogen release process
can be brought to higher than an alloy temperature (T₁) in
15 a hydrogen-absorption process (T₂ > T₁) whereby at least
part of the occluded hydrogen will be made desorbable during
the low-pressure plateau region in the above-mentioned
two-stage plateau or the lower plateau region of the inclined
plateau.

2. The hydrogen storage metal alloy according to
claim 1, wherein the alloy temperature (T₁) during the
hydrogen-absorbing process is brought to a range of from
the extremely low temperature in the living areas on the
25 earth to 373K.

3. The hydrogen storage metal alloy according to
claim 2, wherein the hydrogen storage metal alloy is a V
alloy not only having a suitably adjusted composition to
30 reduce the stability of the occluded hydrogen but also
containing 0 to 95 at% of at least one or more members selected
from the group consisting of Nb, Ta, W, Mo, Ti, Cr, Mn, Fe,
Al, B, Co, Cu, Ge, Ni and Si.

4. The hydrogen storage metal alloy according to
35 claim 3, wherein the hydrogen storage metal alloy is an alloy
having not only a suitably adjusted composition to reduce

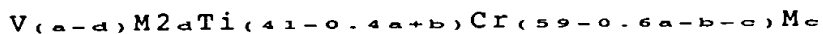
the stability of the occluded hydrogen but also a fundamental composition of the formula:



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wherein $0 \leq a \leq 70$ at% and $-10 \leq b \leq 10$ at%.

10 5. The hydrogen storage metal alloy according to claim 4, wherein the hydrogen storage metal alloy is an alloy having not only a suitably adjusted composition to reduce the stability of the occluded hydrogen but also a fundamental composition of the formula:



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wherein $0 \leq a \leq 70$ at%, $-10 \leq b \leq 10 + c$, $0 \leq c$, $0 \leq d \leq a$, M is at least one or more members selected from the group consisting of Nb, Mo, Ta, W, Mn, Fe, Al, B, C, Co, Cu, Ge, Ln (various lanthanoid metals), N, Ni, P and Si, and M2 is at least one or more members selected from the group consisting of Mo, Nb, Ta, W, Mn, Fe and Al.

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25 6. The hydrogen storage metal alloy according to any of claims 3 to 5, wherein the tissue structure of the above-mentioned suitably adjusted hydrogen storage metal alloy is of a body-centered cubic structure mono phase without any spinodal decomposition phase or has a body-centered cubic structure together with only a minimum spinodal decomposition phase which is unavoidably produced.

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7. A method for absorbing and releasing hydrogen using a hydrogen storage metal alloy which comprises:

35 applying repeatedly hydrogen pressurization and depressurization to the hydrogen storage metal alloy of a body-centered cubic structure-type phase exerting a two-stage or inclined plateau characteristic in a hydrogen

storage amount vs hydrogen pressure relation in an appropriate fashion to absorb and release hydrogen, and at least at one stage during the release of hydrogen, making the temperature (T_2) of the above-mentioned hydrogen storage metal alloy higher than the temperature (T_1) of the hydrogen storage metal alloy during the hydrogen absorption process ($T_2 > T_1$).

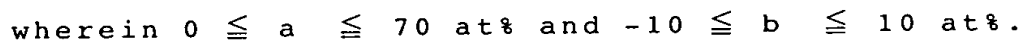
8. The method for absorbing and releasing hydrogen according to claim 7, wherein the alloy temperature (T_1) during the above hydrogen-absorbing process is within a range of from the extremely low temperature in the living areas on the earth to 373K.

9. The method for absorbing and releasing hydrogen according to claim 7 or 8, wherein the composition ratio of the constituent metals for the alloy is adjusted to an appropriate range in order to reduce the stability of the hydrogen occluded in the alloy during the low-pressure plateau region or the lower plateau region of the inclined plateau such that the temperature of the said alloy can be brought to the above high temperature (T_2) whereby at least part of the occluded hydrogen will be made desorbable during the low-pressure plateau region in the above-mentioned two-stage plateau or the lower plateau region of the inclined plateau.

10. The method for absorbing and releasing hydrogen according to claim 9, wherein the hydrogen storage metal alloy is a V alloy not only having a suitably adjusted composition to reduce the stability of the above occluded hydrogen but also containing 0 to 95 at% of at least one or more members selected from the group consisting of Nb, Ta, W, Mo, Ti, Cr, Mn, Fe, Al, B, Co, Cu, Ge, Ni and Si.

11. The method for absorbing and releasing hydrogen according to claim 10, wherein the hydrogen storage

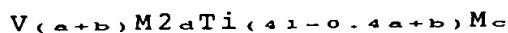
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12. The method for absorbing and releasing hydrogen according to claim 10, wherein the hydrogen storage metal alloy is an alloy having not only a suitably adjusted composition to reduce the stability of the occluded hydrogen but also a fundamental composition of the formula:

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wherein $0 \leq a \leq 70$ at%, $-10 \leq b \leq 10 + c$, $0 \leq c$, $0 \leq d \leq a$, M is at least one or more members selected from the group consisting of Nb, Mo, Ta, W, Mn, Fe, Al, B, C, Co, Cu, Ge, Ln (various lanthanoid metals), N, Ni, P and Si, and M2 is at least one or more members selected from the group consisting of Mo, Nb, Ta, W, Fe and Al.

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~~13. The method for absorbing and releasing hydrogen according to any of claims 10 to 12, wherein the tissue structure of the above-mentioned suitably adjusted hydrogen storage metal alloy is of a body-centered cubic structure mono phase without any spinodal decomposition phase or has a body-centered cubic structure together with only a minimum spinodal decomposition phase which is unavoidably produced.~~

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14. A hydrogen fuel battery equipped with:
a hydrogen storage tank including a hydrogen storage
metal alloy,
a temperature controlling means whereby the above

hydrogen storage metal alloy is directly heated or cooled or the atmospheric temperature of the said hydrogen storage metal alloy is raised or cooled,

5 a fuel battery cell in which hydrogen supplied from the said hydrogen storage tank can be subjected to a chemical change to output an electric power, and

10 a controller where a control is done in such a manner that, with regard to the temperature (T1) of the above hydrogen storage metal alloy during the stage of hydrogen absorption, the temperature of the said alloy during at least one period during the release of hydrogen is made higher (T2) than the temperature (T1) thereof during the above hydrogen-absorbing process.

15 15. The hydrogen fuel battery according to claim 14, wherein the aforementioned controller is capable of appropriately controlling a pressure, temperature and flow rate of the hydrogen gas supplied from the above-mentioned hydrogen storage tank to the above-mentioned fuel battery cell.

20 16. The hydrogen fuel battery according to claim 14 or 15, wherein the above-mentioned temperature controlling means is arranged so as to enable the heat discharged from the above-mentioned fuel battery cell or the exhaust gas discharged from the said fuel battery cell to be utilized for the above-mentioned heating.

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